REMARKS/ARGUMENTS

Description of amendments

Claims 2, 5, 6, and 10-12 are now pending and under examination. Applicant has cancelled claims 1 and 9. No new matter has been added.

Rejections under 35 U.S.C. §102

Claims 1, 2, 9, and 10 were rejected under 35 U.S.C. §102(e) as being anticipated by Tsuji (U.S. Patent 6,285,855). Claims 1, 2, 9, and 10 were rejected under 35 U.S.C. §102(b) as being anticipated by JP 04196280. For the following reasons, Applicant respectfully requests reconsideration and withdrawal of the rejection.

Each of claims 9 and 10 recites that only the homogenizing optical system performs the function of homogenizing the light. Although the claims were rejected as anticipated, the Office Action did not provide any reasons for the rejections. In fact, the subject matter of claims 9 and 10 is clearly not disclosed by the cited references. For example, Tsuji's optical pipes homogenize light at the light exit surface of the optical pipes. Therefore, the alleged homogenizing optical system of Tsuji is not the only device that performs the function of homogenizing the light. Accordingly, the Office Action has not established that claims 9 and 10 are anticipated by Tsuji and JP 04196280.

Each of claims 1 and 2 recites that the "homogenizing optical system homogenizes the non-uniform intensity distribution in the image field of the light emerging from said optical fiber bundle." This feature is not disclosed by Tsuji.

The Office Action contended that Tsuji's integrator 7 and condensing optical system 8 homogenize the non-uniform intensity distribution in the image field of the light emerging from the alleged optical fiber bundle 4. Applicant respectfully submits that this is incorrect. In Tsuji, there is a homogeneous light

distribution at the light exit surface of Tsuji's light mixing means 4. In other words, the light emitted from the light mixing means 4 is already homogenized. Therefore, the light is already homogenized when it reaches the integrator 7 and condensing optical system 8. Accordingly, the integrator 7 and condensing optical system 8 cannot homogenize a non-uniform light distribution.

In JP 04196280, the alleged homogenizing optical system also does not homogenize the non-uniform intensity distribution in the image field of the light emerging from said optical fiber bundle. Referring to the attached copy of Figure 1 of JP 04196280 with handwritten notes, in the object designated by reference numeral 11, the plane of the pupil is noted by hand handwritten marks. The separate images provided by the micro-lenses of the micro-lens-array 8, are imaged onto that pupil whereby homogenizing of the intensity distribution is performed. In the present patent application, on the other hand, the intensity distribution is homogenized in an intermediate image plane outside an object. For appropriate disclosure see on page 8, lines 8-11, or on page 9, description of Figure 1, of the present patent application.

Further, the Office Action incorrectly stated on page 6, lines 3-4, that the exit opening of the fiber bundle is superimposed in an intermediate image plane which is near reference numeral 10 in Figure 1. Applicant respectfully submits that this is incorrect, because reference numeral 10 does not designate an intermediate image plane.

Further regarding claim 2, the claim recites that the homogenizing optical system superimposes the exit opening of the fiber bundle in an intermediate image plane to form a homogeneous intermediate image. In Tsuji, the condensing optical system 8 is physically incapable of superimposing the light emitting from the integrator 7. In Figure 6 of Tsuji, for example, the light emitting from the center of the integrator 7, represented by solid lines, cannot be superimposed on the light emitted from the periphery of the integrator 7, represented by the broken line. In Applicant's invention, on the other hand, all

light emitted from the micro-honeycomb condenser is superimposed by a lens member at one point to homogenize the non-uniform intensity distribution of the light.

In view of the above discussion, Applicant respectfully submits that the anticipation rejections are improper.

Rejection under 35 U.S.C. §103(a)

Claims 1, 2, 5, 6, and 9-12 were rejected under 35 U.S.C. §103(a) as being unpatentable over Suzuki (U.S. Patent 6,456,377) in view of Suzuki (U.S. Patent 5,608,575). For the following reasons, Applicant respectfully requests reconsideration and withdrawal of the rejection.

As an initial matter, Applicant wishes to point out again that each of claims 9-12 recites that only the homogenizing optical system performs the function of homogenizing the light. Although these claims were rejected as obvious, the Office Action did not provide any reasons for the rejection. In fact, the subject matter of claims 9-12 is clearly not disclosed by the cited references.

Turning now to the cited references, Suzuki '377 discloses an exposure system which is completely different from a coordinate measuring instrument. An exposure system is used for processing a wafer in a semiconductor gab. In semiconductor production, wafers are coated with photoresist during the production process. During the exposure process mask patterns are exposed onto the photoresist. Inaccurate alignment of the illumination system causes defects in the patterns achieved in the actual exposure steps and in subsequent process steps.

A coordinate measuring system is used for measuring the coordinates of edges and line widths of mask patterns or of already processed structures on a wafer.

In the Office Action, it was stated that reference numeral 64 relates to a feature that should be measured. Applicant respectfully submits that it is clearly incorrect. Reference numeral 64 does not designate a feature which is to be measured, and no coordinates of reference numeral 64 are measured in Suzuki '377. To support its statement, the Office Action cites column 14, line 58, to column 15, line 28, of Suzuki '377. But in the cited text, no measurement of coordinates is disclosed at all. Instead, the adjustment of the illumination system is described in order to achieve an optimal incident illumination which is necessary for an optimal light amount during the exposure procedure on the wafer.

In the Office Action, reference numeral 100 was cited as designating a detector device for determining the position of a feature. But in column 15, lines 17-28, it is clearly said that photoelectric sensor unit 100 is only used for photoelectrically detecting the projected images of the measurement marks formed on the reticle. Furthermore, the Office Action cites reference numeral 16 in Figure 1 as designating a homogenizing optical system according to the present invention. But in column 14, lines 31-33, it is only stated that reference numeral 16 is used to designate the light flux uniform. No details of the illuminance-uniform optical system 16 are specified in detail. The Office Action cites column 9, line 66, to column 10, line 47, and additionally column 14, lines 27-50, but there is no disclosure that the optical integrator 16 comprises a micro-honeycomb condenser and a lens member. Additionally, it is not disclosed in the cited text that homogenizing of the non-uniform intensity distribution is performed in the image field of the light emerging from the light source. Additionally, no intermediate image plane is disclosed where the exit opening of the fibre bundle is to be superimposed. In both text passages cited by the Office Action, there is no disclosure what was on page 7 of the Office Action.

Therefore, it is clear that Suzuki '377 discloses neither an optical fiber bundle nor a microhoneycomb condenser nor homogenizing of a non-uniform intensity distribution by imaging it into a intermediate image plane.

Regarding the other cited reference, Suzuki '575, the Office Action, referring to Fig. 4, contended that it discloses a coordinate measuring instrument. This is clearly not true. Suzuki '575 discloses an image projection method (and device) for a stepper for semiconductor device manufacturing (see abstract and Fig. 4 and the related description) which is completely different from a coordinate measuring instrument.

The Office Action further contended that that Fig. 4 shows that the substrate (wafer 43) comprises a feature not shown because not yet existing that is to be measured. This is not correct because the non-existing feature is still to be illuminated (as usual in a stepper), but its coordinates are not to be measured. Only the position of the x-y-stage 45 in Suzuki '575 can be measured (see Col. 12, lines 58-62).

The Office Action argues that Suzuki '575 discloses a detector device for determining the position of the (not yet existing) feature on wafer 45 and therefore relates to the reference numerals 47 and 48 in Fig. 4. But this is incorrect. Suzuki '575 clearly discloses: Photodetectors 47 and 48 correspond to pinholes 46a and 46b and serve only to measure quantities of light and to measure intensity distributions (see Col. 13, lines 1-20). There is no disclosure for measuring the position of any feature on wafer 45.

The Office Action states that the fiber bundle 15 of Fig. 4 (see Suzuki '575, Col. 10, lines 40-48) is identical to optical fiber bundle 4 of the present invention. This is not correct as can be seen in Suzuki '575, Col. 10, lines 51-55, and in Fig. 4. There is clearly disclosed that the Suzuki '575 fiber bundle 15 has a single light entrance surface, but its light exit surface is divided into four separate

sections. These four light exit sections provide an aperture splitting in four sections which are not superimposed in any intermediate image plane.

Accordingly, the optical rod 16 comprises four rods 16a-16d corresponding to the four sections of the fiber bundle 15.

Therefore the Suzuki '575 fiber bundle 15 is not a simple waveguide, but a "light divider." So it is completely different from the optical fiber bundle (4) of the present invention.

The present invention discloses one optical fiber bundle 4 and one coupling-out optical system. Suzuki '575 discloses one fiber bundle 15 and four rods 16a-16d as respectively four coupling-out optical systems as discussed before.

The Office Action argues that the projection lens system 42 in Fig. 4 would be identical to the illumination optical system of the present invention which homogeneously illuminates an image field. In opposite to this, in Suzuki '575 the projection lens system 42 projects a reduced image of the circuit pattern of the reticle 41 on a wafer 43 to thereby transfer the circuit pattern to a resist applied to the wafer 43 (see Col. 12, lines 51-57).

Therefore the projection lens system 42 of Suzuki '575 is completely different from the claimed illuminating optical system 6 of the present invention.

As discussed above Suzuki '575 disclose four rods 16a-d instead of one homogenizing optical system in the present invention. Each of the rods 16a-d homogenizes the transmitted light distribution at its light exit end. In opposite to this, in the present invention the homogenizing optical system (6) provides homogenized intensity distribution not at it exit surface, but in the image field (see Fig. 1 and related description of present invention).

The examiner argues that the combination of the optical integrator 19 and the lens system 22 would accord to the claimed homogenizing optical system of the present invention. This is not correct as discussed below.

The optical integrator 19 comprises a combination of small lenses and serves to form a secondary light source having a shape according to Fig. 6. This is not a homogeneous illumination field due to the four sections of light in Fig. 6.

The lens system 22 is not part of an homogenizing system and does not homogenize the light distribution. But the lens system 22 plays an important role in controlling the uniformness of the illumination upon the reticle 42 - not upon the wafer 43 (see Col. 11, line 64 Col. 12, line 2).

Neither the optical integrator 19 nor the lens system 22 nor a combination of both superimpose the four light sections provided the exit openings of the fiber bundle 15 in an intermediate image after the exit surface of the lens system 22.

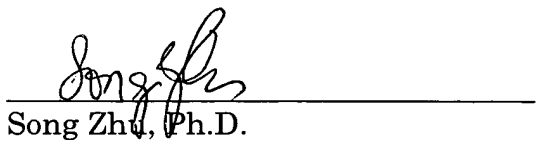
In conclusion, none of the cited Suzuki patents relates to a homogenizing illumination system according to the claimed invention or to a coordinate measuring system. So a person skilled in the art would not find any suggestion to combine both Suzuki patents in order to achieve an illuminating system and/or a coordinate measuring system according to the present invention. Even if a person skilled in the art would combine both Suzuki patents this attempt would not be successful because the result would not be a system according to the claimed invention. Therefore, the claimed invention is neither anticipated nor rendered obvious by the Suzuki patents either alone or in combination.

In light of the foregoing remarks, this application is considered to be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (CAM #037192.49970US).

Respectfully submitted,

July 29, 2004



Song Zhu, Ph.D.
Registration No. 44,420
Jeffrey D. Sanok
Registration No. 32,169

CROWELL & MORING LLP
Intellectual Property Group
P.O. Box 14300
Washington, DC 20044-4300
Telephone No.: (202) 624-2500
Facsimile No.: (202) 628-8844
JDS:SZ:tlm (037192.49970US; 329927)